

Application No. 10/643,682  
Response to Office Action

Customer No. 01933

### R E M A R K S

Reconsideration of this application, as amended, is respectfully requested.

### INFORMATION DISCLOSURE STATEMENT

The Examiner is respectfully requested to return a copy of the Information Disclosure Statement by Applicant Form PTO/SB/08A filed on July 26, 2005, with the Examiner's initials in the left column next to the cited publication (JP 11-31721) to indicate that the cited publication was considered and made of record.

### AFFIRMATION OF ELECTION

Applicants hereby affirm the election of Group I, claims 1 to 14, drawn to a chemical treatment method for further prosecution on the merits.

### TITLE AND ABSTRACT

The title and the abstract of the disclosure were amended to conform the title and the abstract of the disclosure to the elected claims.

### THE CLAIMS

The claims have been amended to make minor editorial improvements and to correct minor antecedent basis problems, so

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as to put the claims in better form for issuance in a U.S. patent.

Specifically, claims 1 and 2 have been amended to clarify that "first acidic treatment solution" is an "acidic reduction treatment solution" (see the disclosure in the specification at, for example, page 4, lines 5 to 13).

Further, claims 1 and 4 have been amended to clarify that "second acidic treatment solution" is an "etching treatment solution" (see the disclosure in the specification at, for example, page 10, line 27 to page 11, line 6).

In addition, claim 1 has been amended to clarify that "an alkaline treatment solution" is "an alkaline reduction treatment solution" and that "an acid dip step of dipping the metal film" is "an etching step comprising etching the metal film" (see the disclosure in the specification at, for example, page 4, lines 5 to 15 and page 10, line 27 to page 11, line 6).

Claim 5 has been amended to clarify that "an acidic treatment solution" is "an acidic etching treatment solution" and that "a treatment solution" is "a reduction treatment solution" (see the disclosure in the specification at, for example, page 4, lines 5-15 and page 10, line 27 to page 11, line 6).

Claim 7 has been amended to better comply with the requirements of 35 USC 112 and to more clearly recite the distinguishing features of the present invention. The

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informalities pointed out by the Examiner have all been corrected. More specifically, claim 7 has been amended to make it dependent from claim 6.

Claim 8 has been amended to clarify that "a treatment solution" is "an etching treatment solution" (see the disclosure in the specification at, for example, page 10, line 27 to page 11, line 6).

In addition, new claims 24 and 25 have been added to recite the features of original claim 7 and to be dependent from claims 4 and 5, respectively.

New claim 26 recites a feature of original claim 3.

New claims 27 to 29 are supported in the specification on page 5, line 15.

It is respectfully submitted that no new matter has been added, and that the amended claims and the new claims are in full compliance with the requirements of 35 USC 112, second paragraph. Accordingly, it is respectfully requested that the amendments to the claims and the new claims be approved and entered.

Further, it is submitted that minor revisions have been made only to correct minor informalities in the original claims - and that there have been no amendments/revisions which affect the scope of the claims, either literally or under the doctrine of equivalents.

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THE REJECTION UNDER 35 USC 112

Claim 7 was rejected under 35 USC 112, second paragraph, for the reasons set forth at the middle of page 3 of the Office Action.

Claim 7 was amended to avoid the rejection under 35 USC 112, second paragraph.

It is therefore respectfully requested that the rejection under 35 USC 112, second paragraph, be withdrawn.

THE PRIOR ART REJECTIONS

Claims 1 to 2, 4 to 9, 11 to 12 and 14 were rejected under 35 USC 102 as being anticipated by USP 3,915,809 ("Wheatley") for the reasons set forth on pages 3 to 5 of the Office Action.

For the following reasons, it is respectfully submitted that Wheatley does not disclose, teach or suggest the present claims 1 and 11.

At column 2, (Description of the preferred embodiments), lines 20 to 32, Wheatley recites the following:

"The surface of a sheet of a commercially available polymethyl methacrylate plastic such as Acrylite is used as a substrate. It is thoroughly sanded with a 600 grit emery paper. It is first sanded with a plurality of longitudinally mutually parallel strokes and then with a plurality of longitudinal mutually parallel strokes perpendicular the first. Afterwards, the substrate surface is washed with water to remove the dust from sanding. The sanded and rinsed

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polymethyl methacrylate substrate is dipped in methanol for about 10 seconds. Spray rinsing with methanol can be used instead of dipping the substrate in a methanol bath. The polymethyl methacrylate substrate is then rinsed with water."

At column 2, (Description of the preferred embodiments), lines 32 to 40, Wheatley describes as follows:

"Following the rinse, it is sensitized, activated, and electrolessly plated with copper in the normal and accepted manner. For example, the substrate can be dipped in an aqueous solution containing 159 grams per liter stannous chloride for about 4 minutes, and then rinsed with water. It is then immersed in an aqueous solution containing 7.5 grams per liter palladium chloride for about 4 minutes, and again rinsed with water."

At column 2, (Description of the preferred embodiments), lines 40 to 50, Wheatley describes as follows:

"The polymethyl methacrylate substance is then immersed for about 10 minutes in an aqueous electroless copper solution of the following composition:

CuSO <sub>4</sub> . 5H <sub>2</sub> O	15 grams per liter
Na <sub>2</sub> C <sub>4</sub> H <sub>4</sub> O <sub>6</sub> . 2H <sub>2</sub> O	30 grams per liter
NaOH	14 grams per liter
pH	13.2
Formaldehyde	10 ml per liter"

At column 2, line 50 to column 3, line 26, Wheatley describes as follows:

"The polymethyl methacrylate substrate is then removed from the electroless copper solution and

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rinsed. The electroless copper deposit can be electroplated with successive blanket layers of copper, nickel and chromium in the usual way for depositing such metals or any metallic substrate.

For example, the electrodeposited blanket layer of copper can be deposited at room temperature from an aqueous solution containing:...

A 0.025 mm thick layer of copper is electrodeposited at a current density of 4.3 amperes per square decimeter, which takes about 30 minutes. The substrate is then rinsed with water and electroplated with nickel.

A 0.0127 mm thick blanket nickel layer is deposited onto the copper layer by electrodeposition for about 15 minutes at a current density of about 4.7 amperes per square decimeter at a temperature of about 60°C in an aqueous solution containing:...

After nickel plating the substrate is rinsed with water and immersed in a chromium plating bath of the following composition:...

A flash blanket coating of chromium, less than about 0.000025 mm thick can be used. It is deposited at a current density of about 23 amperes per square decimeter for about 3 minutes at a temperature of about 41°C."

At column 3, lines 27 to 34, Wheatley describes as follows:

"A photosensitive coating, a resist, is then applied to the chromium plated surface by brushing, spraying or the like. One photosensitive coating which can be used is Dynachem 3140. The photosensitive coating is selectively exposed through a pattern mask and the resultant pattern developed. This leaves an etch resist mask selectively on the metal surface of the plated substrate, corresponding to the metal pattern desired."

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At column 3, lines 34 to 39, Wheatley describes as follows:

"The substrate is then immersed for about 2 minutes in a room temperature aqueous solution containing 50 volume percent concentrated hydrochloric acid. This selectively etches away the unwanted portions of the chromium layer."

At column 3, lines 39 to 45, Wheatley describes as follows:

"The masked substrate is then rinsed, and spray etched for about 4 minutes at room temperature with a 42° Baume ferric chloride solution. This removes the unwanted portions of the copper and nickel layers. The masked substrate is then rinsed again and dried. After drying, the resist is removed with an organic solvent, and the substrate dried again."

It is clear that in Wheatley, the surface of a polymethyl methacrylate substrate is pretreated and electrolessly plated with copper. Then, Cu/Ni/Cr are successively deposited onto the substrate by the known electrolytic plating; thereafter, an etching resist is applied to the chromium layer, and an etching mask is formed by exposure using a predetermined mask and development. After Cr is etched by HCl, a ferric chloride solution is sprayed to etch Cu/Ni, the resist is removed with an organic solvent, and then the substrate is rinsed and dried. After that, an adhesive coating of metal layer is selectively deposited onto the polymethyl methacrylate substrate.

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In contrast to Wheatley, applicants' claims 1 and 11 concern a method to etch a metal film uniformly and stably; therefore, applicants' claims 1 and 11 substantially differ from Wheatley which involve etching by immersing a substrate in a 50 volume percent concentrated hydrochloric acid.

Applicants claim 2 patentably distinguishes over Wheatley for the following reasons.

At column 3, lines 15 to 21, Wheatley describes the following:

"After nickel plating the substrate is rinsed with water and immersed in a chromium plating bath of the following composition:

CrO <sub>3</sub>	248 grams per liter
H <sub>2</sub> SO <sub>4</sub>	2.48 grams per liter"

From the above description, it is evident that sulfuric acid is a part of the composition of the chromium plating bath in Wheatley.

In contrast to Wheatley, applicants' claim 2 recites that sulfuric acid can be used in the reduction treatment solution itself and, therefore, claim 2 considerably differs from Wheatley.

Applicants' claim 5 is patentable over Wheatley for the following reasons.



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At column 3, lines 34 to 38, Wheatley describes as follows:

"The substrate is then immersed for about 2 minutes in a room temperature aqueous solution containing 50 volume percent concentrated hydrochloric acid. This selectively etches away the unwanted portions of the chromium layer."

Wheatley thus discloses that the chromium layer can be etched by immersing it in a room temperature aqueous solution containing 50 volume percent concentrated hydrochloric acid. However, this method of chromium etching has a defect that the chromium layer cannot be etched uniformly and stably.

In contrast to Wheatley, applicants' claim 5 can reduce an oxidized film on a metal material to a metal first, and then etch the metal uniformly and stably with an etching treatment solution. Therefore, applicants' claim 5 substantially differs from Wheatley in this respect.

Applicants' claim 6, which depends on claim 5, substantially differs from Wheatley for the reasons discussed in the preceding paragraph.

Applicants' claim 7 depends on claim 5 and thus substantially differs from Wheatley for the reasons discussed hereinabove.

Applicants' claim 8 depends on claims 1 to 6 and thus substantially differs from Wheatley for the reasons discussed

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hereinabove.

Applicants' claim 9 depends on claim 8 and thus substantially differs from Wheatley for the reasons discussed hereinabove.

Applicants' claim 10 depends on claim 8 and thus substantially differs from Wheatley for the reasons discussed hereinabove.

Applicants' claim 12 depends on claims 1 to 5 and 11 and thus substantially differs from Wheatley for the reasons discussed hereinabove.

Applicants' claim 14 depends on claim 11 and thus substantially differs from Wheatley for the reasons discussed hereinabove.

For the reasons explained above, Wheatley does not teach, suggest or disclose applicants' claims 1 to 2, 4 to 9, 11 to 12 and 14. Withdrawal of the 35 USC 102 rejection is therefore respectfully requested.

Claim 3 was rejected under 35 USC 103 as being unpatentable over Wheatley in view of USP 5,294,326 ("Shahin") for the reasons stated on page 6 of the Office Action.

It was admitted in the Office Action that Wheatley does not specify that the first acidic treatment solution can contain potassium chloride.

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For the reasons discussed above, Wheatley substantially differs from applicants' claim 1. Since claim 3 is dependent from claim 1, it is respectfully submitted that applicants' claim 3 differs substantially from Wheatley and claim 3 is not obvious over Wheatley in view of Shahin.

Claims 10 and 13 were individually rejected under 35 USC 103 as being unpatentable over Wheatley in view of USP 5,425,822 ("Hidaka et al") for the reasons set forth beginning at the middle of page 6 and continuing to the top of page 7 of the Office Action.

It was admitted in the Office Action that Wheatley does not specify forming a chromium alloy layer.

As discussed above, Wheatley differs substantially from applicants' claims 1, 5 and 11. Since claim 8 is dependent on claims 1 to 6 and claim 13 is dependent on claims 1 to 5 and 11, it is respectfully submitted that claims 10 and 13 also differ substantially from Wheatley. Thus, it is respectfully submitted that claims 10 to 13 are not obvious over Wheatley in view of Hidaka et al.

Applicants' claims 10 and 13 contain one of the following metals as a specific metal of an alloy: chromium, titanium, tungsten, palladium and molybdenum. Therefore, applicants' claims 10 and 13 are submitted to have no relation to Hidaka et al. which disclose a chromium alloy which includes nickel,

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tungsten and molybdenum, and can include one or more of carbon, boron, aluminum and silicon, wherein carbon increases the wear resistance of chromium.

In view of the foregoing, it is respectfully submitted that the above-described claimed features and advantageous effects of the presently claimed invention recited in the claims are not taught or suggested by the cited references.

Accordingly, it is respectfully submitted that claims 10 and 13 patentably distinguish over Wheatley, Shahin and Hidaka et al, taken singly or in any combination.

Withdrawal of 35 USC 103 rejections is thus respectfully requested.

In view of the foregoing, entry of this Amendment, allowance of the claims and the passing of this application to issue are respectfully solicited.

If the Examiner has any comments, questions, objections or recommendations, the Examiner is invited to telephone the undersigned for prompt action.

Respectfully submitted,



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